

What is claimed is:

## 1. A fine filtering apparatus comprising:

a main body which is a main pathway of supplied water, the supplied water flowing in the longitudinal direction of the main body;

5 filter media comprising flexible fibers enclosed by the main body and extending in the longitudinal direction of the main body, the flexible fibers controlling a packing density and filtering out a variety of suspended solids contained in the supplied water;

a supplied water guide jacket supplying the supplied water to the side of the lower portion of the main body;

10 a filter media fixing plate installed at the lower end of the supplied water guide jacket and having a plurality of fixing holes fixing lower ends of the flexible fiber filter media;

a density control plate having a doughnut shape, installed between the supplied water guide jacket and the filter media fixing plate and preventing the supplied water  
15 from flowing to the filter media fixing plate by increasing filling density of the flexible fibers fixed to the filter media fixing plate in hollow portion of the density control plate;

an inner porous chamber extending from the top of the main body and having a constant radius, the inner porous chamber increasing a density of upper layer of the filter media, and having a plurality of treated water supply holes formed therein through  
20 which water treated by the filter media is discharged outside of the main body; and

a concentrated filtrate discharge jacket covering a portion of the top and surrounding part of the outside of the main body, and discharging concentrated filtrate entrapped by the filter media, after being backwashed, outside of the main body.

25 2. The fine filtering apparatus of claim 1, wherein lower ends of the flexible fibers are fixed to the filter media fixing plate and upper ends of the flexible fibers are not fixed; a plurality of supplied water passing holes are formed in an area of the main body corresponding to the supplied water guide jacket, and the concentrated filtrate discharge jacket is cylindrical and has a jacket shape such that the concentrated filtrate  
30 is discharged outside of the filtering apparatus through a predetermined discharge pipeline.

3. The fine filtering apparatus of claim 1, further comprising a lower attached

structure supporting the filter media fixing plate from below and having a backwash air supply pipeline supplying backwash air during backwashing.

4. The fine filtering apparatus of claim 3, wherein a plurality of backwash air supply holes, through which the backwash air passes, are formed in the filter media fixing plate in a hexagonal arrangement, or are formed in the upper portion of the backwash air supply pipeline within the main body.

5. The fine filtering apparatus of claim 1, wherein a volume of the inner porous chamber is 10 to 50 % of the volume of the main body.

6. The fine filtering apparatus of claim 1, wherein the flexible fibers are composed of a single material or different materials according to the supplied water to be filtered or a degree of treatment of the supplied water.

7. The fine filtering apparatus of claim 1, wherein the quality of the clarified water is controlled according to the packing density of the flexible fibers, filtration flux, and surface toughness and thickness of the flexible fiber.

8. The fine filtering apparatus of claim 1 or 3, wherein the supplied water and backwash air are supplied to the supply pipeline and filtering and backwashing are performed in the same direction.

9. The fine filtering apparatus of claim 1, wherein an extra water tank, pump, valve, and piping for backwash are not required by using the supplied water as backwash water during backwashing.

10. The fine filtering apparatus of claim 9, wherein filtering and backwashing are performed in the same direction by using the supplied water as the backwash water during backwashing.

11. The fine filtering apparatus of claim 4, wherein during backwashing, backwash air intermittently supplied through the backwash air supply holes of the filter

media fixing plate or the backwash air discharge holes of the backwash air supply pipeline produces turbulence thereby generating shearing stress in the flexible fiber filter media and allowing contaminants entrapped by the filter media to separate from the filter media in a short period.

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12. The fine filtering apparatus of claim 11, wherein the backwash air is generated by an air compressor, stored under high pressure in a storage tank connected to the backwash air supply pipeline, and then periodically supplied to the main body during backwashing.

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